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A Revisional Study of the Taiwanese Scarabaeinae (Coleoptera, Scarabaeidae)

Part 2. Two New Species and Males of *Onthophagus roubali* and *O. hsui*

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Abstract This is the second part of a revisional study of the Taiwanese Scarabaeinae. *Onthophagus* (*Parascatonomus*) *kiuchianus* sp. nov. and *Sinodrepanus tsaii* sp. nov. are described, and a male specimen of *O.* (s. str.) *roubali* Balthasar, 1935 and a small-sized male of *O.* (*Indachorius*) *hsui* Masumoto, Chen et Ochi, 2004 are described for the first time.

The authors have been studying Taiwanese dung beetles for these three years, particularly species of the subfamily Scarabaeinae. In the first part of this series (Masumoto *et al.*, 2004), two new *Onthophagus* species from Taiwan were described. As the second part, other two new species and male specimens of two known species will be described.

Nomura (1973) recorded two species from Taiwan under the names *Onthophagus* (s. str.) *kuatunensis* Balthasar, 1942 and *Drepanocerus arrowi* Balthasar, 1932, both originally described from China. The authors have carefully re-examined the specimens collected from Taiwan, and have concluded that they are new to science.

Of the other two species, one has been known from only females. In the other species, a small male individual has not developed the cephalic horn completely, and instead it is provided with a pair of small tubercles. It will be described together with the male of the former species.

The authors would like to express their gratitude to Mr. Yasuyuki UEDA, Fujisawa City, Dr. Chun-Lin LI, National Taiwan University, Taipei City, Dr. Li-Cheng TANG* and Mr. Kuo-Hung CHUANG, Department of Entomology, National Chung Hsing University, for offering materials, and Dr. Chi-Feng LEE, Institute of Zoology, Academia Sinica, Taipei City, Mr. Hui-Yung LEE, National Taiwan University, and Jing-Fu TSAI, National Chung Hsing University, Taichung City, for their kind assistance in field works. They also thank Dr. Giulio CUCCODORO, Muséum d'Histoire Naturelle, Genève, for loaning the type specimens and also thank Dr. Makoto KIUCHI, Tsukuba City, for taking very clear photographs inserted in this paper and offering invaluable suggestions.

Depositories of the type specimens to be designated are given under each description. The abbreviations used herein are as follows: NCHU – National Chung Hsing University, Taichung; NMNST – National Museum of Natural Science, Taichung; NSMT – National Science Museum (Nat. Hist.), Tokyo; NTU – Department of Entomology, National Taiwan University, Taipei; TARI – Taiwan Agricultural Research Institute, Wufeng; COO – Collection OCHI, Osaka.

***Onthophagus* (*Parascatonomus*) *kiuchianus* sp. nov.**

(Fig. 1)

Piceous, with anterior margin of head, basal parts of antennae, mouth parts and legs dark reddish brown, head and pronotum with a weak purple tinge in some individuals, antennal clubs pale brown; head and pronotum rather strongly shining, elytra feebly sericeous, ventral surface mostly alutaceous; dorsal surface almost glabrous, ventral surface clothed with rather long hairs. Body ovate, rather strongly convex dorsad, gently flattened in posterior part, and rather remarkably constricted between pronotum and elytra.

Male. Head gently produced apicad, almost flat in anterior part; clypeus rugoso-punctate, with apical margin produced in middle, weakly reflexed and slightly indented at the borders of genae; clypeo-frontal border curved and weakly carinate; geno-clypeal sutures partly impressed and partly slightly ridged; ocular lobes (genae) somewhat parallelogrammatic, obtusely produced laterad, feebly concave, and weakly rugoso-punctate; frons short, quadrate, gently, transversely concave, transversely rugoso-punctate; vertex with a distinct ridge in the middle a little before the posterior margin, which becomes bolder in middle, with a flattened top, whose surface is rather smooth and scattered with small punctures. Antenna short and compact; scape short, invisible from dorsal view; club segments compact, with three segments successively diminishing distad in size.

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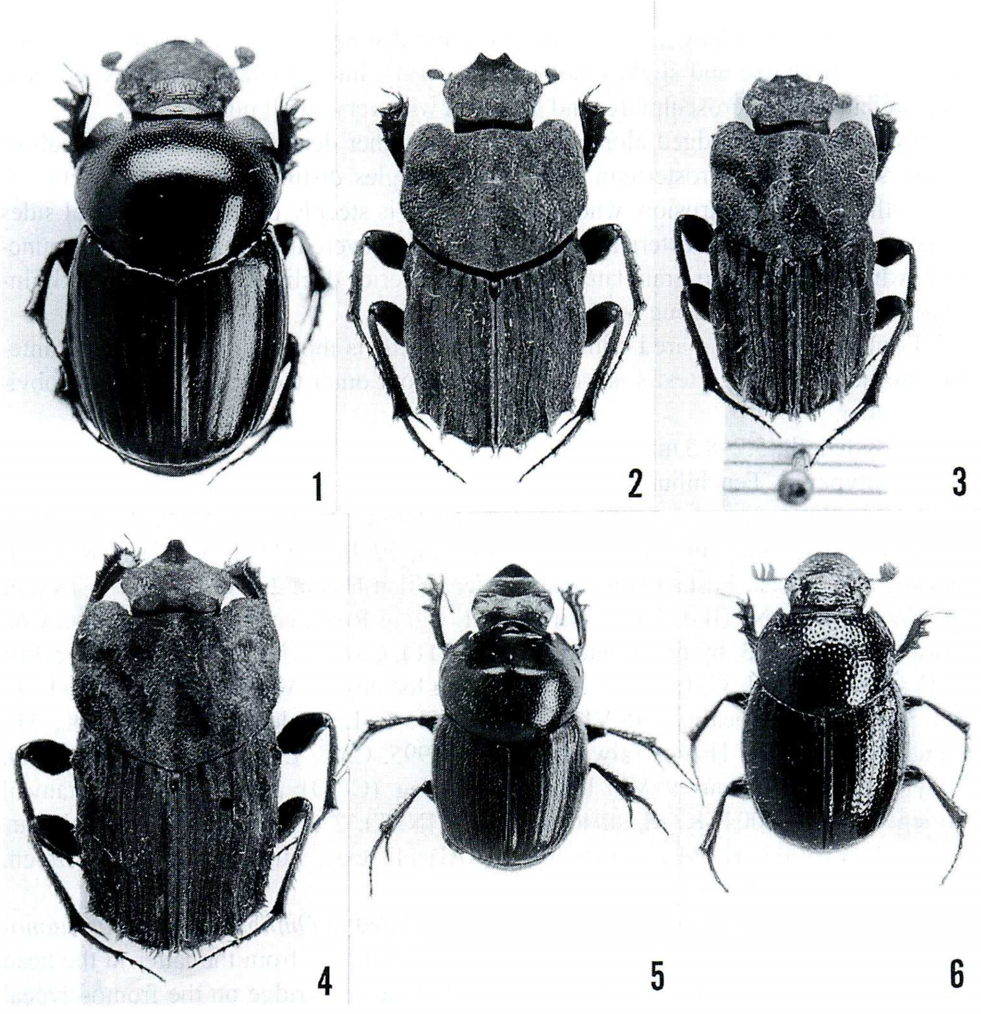


Figs. 1–6. Habitus of *Onthophagus* and *Sinodrepanus* spp. from Taiwan; 1, *Onthophagus* (*Parascatonomus*) *kiuchianus* sp. nov., holotype ♂; 2, *Sinodrepanus tsaii* sp. nov., holotype ♂; 3, *S. besucheti* SIMONIS, holotype ♂; 4, *S. rosannae* SIMONIS, holotype ♂; 5, *Onthophagus* (s. str.) *roubali* BALTHASAR, ♂; 6, *Onthophagus* (*Indachorius*) *hsui* MASUMOTO, CHEN et OCHI, ♂ (minor).

Pronotum evenly convex, about 1.33 times as wide as long, with a feeble longitudinal groove along median line in basal half; anterior margin gently emarginate; lateral margins evenly and roundly produced laterad, slightly sinuate in posterior parts, finely bordered; base somewhat triangular with rounded sides, bluntly angulate at the middle, with marginal border effaced throughout; anterior angles gently produced and subangulate; surface smooth, covered with small but deep punctures, which are intermixed with minute punctures, the larger punctures becoming denser and coarser antero-laterad.

Elytra almost as long as wide, shallowly and distinctly punctato-striate, the punctures in striae sparse and slightly notching intervals; intervals feebly convex, covered with isodiametric microsculpture, and scattered with very small punctures.

Pygidium finely ridged along basal margin, rather densely covered with shallow transverse punctures. Prosternum with anterior angles distinctly hollowed. Metasternum with a medial protrusion, whose anterior side is steeply inclined and lateral sides are gently hollowed; metasternal shield moderately covered densely with small punctures, which change into granulate ones on the anterior declivity. Protibiae weakly incurved, each with four strong outer teeth.

Female. As compared with male, the clypeus is more strongly produced anteriad, the ridge on the vertex is narrower, and the four outer teeth of protibiae are obviously bolder.

Body length: 5.7–8.3 mm.

Holotype: ♂, Fenchihu, Chiayi Hsien, Taiwan, 23–XI–2003, K. MASUMOTO leg. (NMNST). Paratypes: 1 ex., "Funchiifo", Formosa, 21–VI–1971, Y. MAEDA leg. (NSMT); 1 ex., Shuejian, Miaoli Hsien, Taiwan, 29–IV–2002, L.-C. TANG & K.-H. CHUANG leg., 5 exs., Fushan Botanical Garden, Yilan Hsien, 27–V–2004, J.-F. TSAI & T.-C. WANG leg. (NCHU); 1 ex., Nei Dong Logging Road, ca. 850 m alt., Taipei Co., Taiwan, 18–IV–2003, by flying intercept trap (FIT), C.-L. LI leg., 5 exs., same locality, 24–IV–2003, by FIT, C.-L. LI leg., 2 exs., same locality, 3–VI–2003, by FIT, C.-L. LI leg., 3 exs., same locality, 10–VI–2003, by FIT, C.-L. LI leg., (NTU); 2 exs., Mt. Hehuanshan, Nantou Hsien, Taiwan, 13–VIII–1995, C.-C. LUO leg., 1 ex., Fenchihu, Chiayi Hsien, C. Taiwan, 9–VII–1974, T. OCHI leg. (COO); 2 exs., Fushan Botanical Garden, 7~8–V–2004, K. MASUMOTO leg. (NMNST); 2 exs., Fushan Botanical Garden, 7~8–V–2004, K. MASUMOTO leg. (TARI); 45 exs., Fushan Botanical Garden, 7~8–V–2004, K. MASUMOTO leg.

Notes. The present new species is closely related to *Onthophagus* (*Parascatonomus*) *kuatunensis* BALTHASAR, 1942 from China, but differs from the latter in the head with a transverse ridge on the vertex and also with a weak ridge on the fronto-clypeal border (entirely flat and simple in *O.* (*P.*) *kuatunensis*), and the pronotum with anterior angles more strongly produced. NOMURA (1973, p. 48) recorded *O.* (s. str.) *kuatunensis* from Taiwan, but actually it is *O.* (*P.*) *kiuchianus*. This new species also resembles *O.* (s. str.) *formosanus* GILLET, 1924, but can be distinguished from the latter by the head with two transverse ridges and the pronotum not grooved along the median line.

The specific name is given after Dr. Makoto KIUCHI, Tsukuba City, who has assisted our study on the Taiwanese dung beetles.

Sinodrepanus tsaii sp. nov.

(Figs. 2, 7–8)

Brownish black with feeble coppery tinge, almost wholly covered with brownish grey earthy matter, rather sparsely clothed with long scale-like hairs on ridges of dorsal surface, which often form small bundles. Body subrectangular, flattened above.

Male. Head somewhat widely pentagonal, flattened but raised in apical and lateral parts, feebly covered with isodiametric microsculpture, scattered with small and large punctures, the latter becoming somewhat ring-shaped and denser anteriad; clypeus with the anterior margins straightly convergent apicad and strongly reflexed and bidentate at the apex, the area between the teeth rather deeply emarginate; ocular lobes gently produced laterad, with outer margins obtusely angulate, areas before eyes weakly concave; frons not defined from clypeus and ocular lobes, gently raised in middle; vertex with a pair of low longitudinal ridges close to hind margin, areas among and outside the ridges weakly concave. Eyes oblique and crescent-shaped.

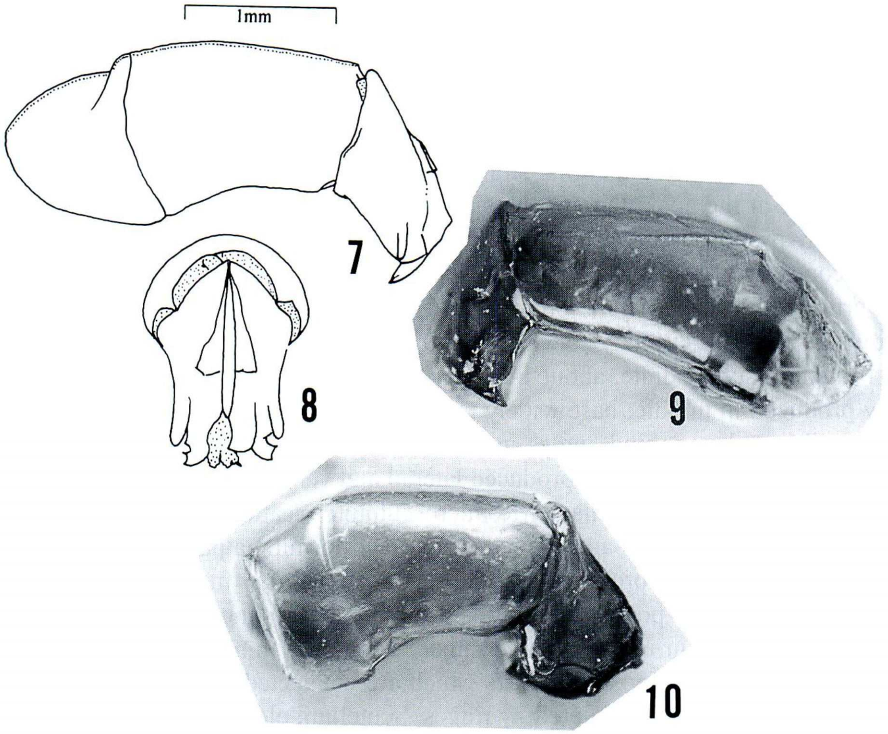
Pronotum subquadrate, about 1.2 times as wide as long; apex widely emarginate, feebly produced in middle; base widely triangular, with weakly curved sides; front angles roundly produced, hind angles invisible being covered with protrusion of lateral margins; lateral margins feebly produced laterad and very slightly narrowed in middle; disc feebly covered with isodiametric microsculpture, scattered with small and large punctures, gently convex in antero-medial part, and forming a pair of longitudinal elevations, with shallow depressions as follows: a narrow one in antero-medial part, a wide triangular one in postero-medial part, a pair of indistinct ones in anterior parts near front angles, a pair of oblique and rather strong ones in medio-lateral parts, a pair of subtriangular ones in posterior parts which are connected with medio-lateral ones; most of these depressions bordered by ridges. Scutellum elongated linguiform, weakly raised medially, glabrous, and covered with isodiametric microsculpture.

Elytra slightly longer than wide, widest near base; disc covered with isodiametric microsculpture, scattered with small punctures, punctato-striate, the striae glabrous and finely margined, the punctures in striae very shallow, notching intervals, each with a small tussock; 1st (sutural) intervals raised and densely covered with scale-like hairs, 2nd to 4th flattened and slightly concave, 5th and 7th raised and provided with tufts of rough scale-like hairs, 6th concave in basal part and depressed outwards in posterior 2/3, 7th strongly produced laterad in middle; distal parts of elytra with tufts of long hairs.

Pygidium sublinguiform, covered with isodiametric microsculpture, shallowly punctate, the punctures ill-shaped, depressed in basal 3/5, ridged in basal 2/5 medially, with a pair of humps at the middle, whose tops are covered with tussocks. Metasternal shield closely punctate, covered with short scale-like hairs, glabrous along medial line, with a subpentagonal depression in medial part close to hind margin. Protibiae with three outer teeth.

Female. As for the characteristics on the dorsal parts, there is no difference from the male. On the ventral part, the female possesses shorter pygidium and longer abdominal segments than the male.

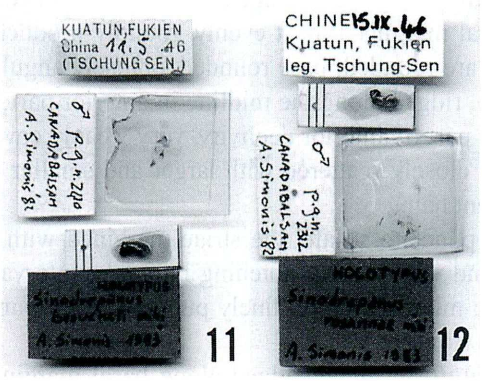
Holotype: ♂, Huanshan (ex-Hung Mao), 1,500 m alt. (attracted by rotten chicken meat), Taichung Hsien, C. Taiwan, 26–IV–2003, L.-C. TANG & K.-H. CHUANG leg.



Figs. 7–10. Male genitalia of *Sinodrepanus*; 7, *S. tsaii* sp. nov. (lateral view); 8 ditto (frontal view); 9, *S. besucheti* SIMONIS (lateral view); 10, *S. rosannae* SIMONIS (lateral view).

(NMNST). Paratypes: 1 ex., "Summit of ???", Formosa, 11–VI–1933, T. KANO leg. (NSMT); 1 ex., Peitungyen Shan, Nantou Hsien, C. Taiwan, 27–VIII–2003, J.-F. TSAI leg. (NCHU); 1 ex., Mt. Kuantao Shan, Nantou Hsien, C. Taiwan, 26–VII–1995, C.-C. LUO leg.; 1 ex., same collecting data (Y. UEDA collection); 1 ex., Baibara (Meiyuan, Nantou Hien), Formosa, 7–VII–1939, Y. MIWA leg. (TARI); 1 ex., Shuejian, Miaoli Hsien, C. Taiwan, 27–VII–2002, L.-C. TANG & K.-H. CHUANG leg.; 1 ex., 29–IX–2002, same collecting data; 4 exs., Huanshan, Taichung Hsien, 3–XI–2002, L.-C. TANG & K.-H. CHUANG leg.; 6 exs., 18–VIII–2003, same locality; 2 exs., Chu-yun-shan, Tengchi, Kaohsiung Hsien, S. Taiwan, 16–V–2004, J.-F. TSAI & T.-C. WANG leg.

Notes. This new species resembles *Sinodrepanus besucheti* SIMONIS, 1985, from Kuatun, Fukien (Figs. 3, 9 & 11) but can be distinguished from the latter by the clypeus noticeably bidentate and reflexed in front, the ocular lobes more strongly produced laterad, the pronotum more widely produced postero-laterad, and the male genitalia differently shaped. This new species also resembles *S. rosannae* SIMONIS, 1985, also from Kuatun, Fukien (Figs. 4, 10 & 12), but can easily be distinguished from the latter by the body narrower with the apex of clypeus bidentate. As mentioned in the in-



Figs. 11–12. Holotype labels. —— 11, *Sinodrepanus besucheti* SIMONIS; 12, *S. rosannae* SIMONIS.

troduction, NOMURA (1973) recorded *Drepanocerus arrowi* BALTHASAR, 1932, but it is actually this new species.

The specific name is given after Mr. Jin-Fu TSAI, a young entomologist of National Chung Hsing University, who has been a member of our joint-study team on the Taiwanese fauna of dung beetles and has contributed in various ways.

Onthophagus (s. str.) ***roubali*** BALTHASAR, 1935

(Fig. 5)

Onthophagus (s. str.) *roubali* BALTHASAR, 1935, Folia zool. hydrobiol., **8**: 316.
O. roubali: NOMURA, 1973, Ent. Rev. Japan, Osaka, **25**: 49 [nec BALTHASAR].

BALSTHASAR (1935) described this species based on a female from "Tatsienlu, Szechouan". Since then, there has never been any account of a male. Recently, Dr. Chun-Lin LI, National Taiwan University, offered two strange *Onthophagus* specimens collected from North Taiwan to the authors. After a careful study, the authors have concluded that they are males of *Onthophagus roubali* BALTHASAR, 1935. They will be described below.

Piceous to dark reddish brown, head and pronotum rather shining and elytra rather mat; noticeably covered with short pale hairs. Body oblong-ovate, rather convex dorsad but gently flattened in posterior part.

Head strongly produced and inclined anteriad, rather closely scattered with small punctures; clypeus feebly concave in anterior part, reflexed in front, feebly rugulose in lateral parts, fronto-clypeal border weakly ridged, the ridge sinuous on each side and almost reaching lateral margins; ocular lobes feebly concave, weakly produced laterad; frons widened anteriad, with a pair of somewhat elongated triangular impunctate areas; fronto-genal borders weakly sulcate; vertex with a pair of slightly flattened horns, which are connected with each other at the base, gently curving outwards, and slightly inclined backwards.

Pronotum wider than long (10 : 7); apex weakly emarginate, slightly produced anteriad in middle; lateral margins almost evenly, roundly produced; front angles rather acute, but the corners are rounded; base rounded, obtusely angulate at the middle; disc rather strongly convex, ridged along the midline in anterior part, which is briefly interrupted at the posterior part of anterior declivity, very weakly covered with isodiametric microsculpture, rather closely scattered with larger and smaller punctures, each of the former with a short bent hair.

Elytra shallowly punctato-striate, the striae margined with low ridges, the punctures in striae small and very weakly notching intervals; intervals feebly convex, covered with isodiametric microsculpture, finely punctate, each puncture with a bent seta and a small granule in front.

Pygidium sublinguiform, finely ridged along basal margin, covered with isodiametric microsculpture, scattered with umbilicate punctures, each with a bent hair. Metasternal shield covered with small punctures and bent hairs, minutely punctate among the former, and glabrous along medial line. Protibiae with four outer teeth.

Specimens examined. 1 ex., Nei Dong Logging Road, ca. 850 m alt., Taipei Co., N. Taiwan, 24–IV–2003, C.-L. Li leg. (NTU); 1 ex., 9 km, Nei Dong Logging Road, ca. 850 m alt., Taipei Co., N. Taiwan, 4–X–2002, C.-L. Li leg. (NSMT).

Onthophagus* (*Indachorius*) *hsui Masumoto, Chen et Ochi, 2004

(Fig. 6)

Onthophagus (*Indachorius*) *hsui* Masumoto, Chen & Ochi, 2004, Elytra, Tokyo, **32**: 126.

The most distinctive male characteristics of the species, *Onthophagus* (*Indachorius*) *hsui* Masumoto, Chen et Ochi, 2004, is the possession of a thin oblong horn on the vertex, whose upper edge is pointed at each lateral corner, and armed with an elongate, backwardly curved finger at the middle in larger individuals. In smaller individuals, the cephalic horn is reduced to a low triangular prominence. In the course of their research project, the authors have obtained very small male individuals (4.6–4.9 mm in length), whose vertexes are armed with pairs of tubercles. Though such a feature is of a female, they were determined as male of *O. hsui* for the reasons of its legs with three outer teeth (four outer teeth in female), and of the clypeus more strongly produced apicad.

Specimens examined. 1 ex., Rongshu Community, Hualien Hsien, Taiwan, 3–V–2004, J.-H. Tsai leg. (NCHU); 1 ex., Fushan Botanical Garden, Ilan Hsien, Taiwan, 7∼8–V–2004, K. Masumoto leg. (NSMT).

要　　約

益本仁雄・楊　曼妙・越智輝雄：台湾産タマオシコガネ亜科の再検討．その2．エンマコガネ属および*Sinodrepanus*属の各1新種，および*Onthophagus roubali* Balthasarの雄と*O. hsui* Masumoto, Cehn et Ochiの小型の雄の記載．―― 台湾産タマオシコガネ亜科の研究の第2報と

して，まず*Onthophagus* (*Parascatonomus*) *kiuchianus* sp. nov. および*Sinodrepanus tsaii* sp. nov. を記載した．前者は中国大陸から記載された*Onthophagus* (*Parascatonomus*) *kuatunensis* BALTHASAR, 1942，また後者は同じく中国大陸から記載された*Drepanocerus arrowi* BALTHASAR, 1932とされていたものであるが，詳細に検討した結果，新種であることが判明した．また，第3の種は，*O.* (s. str.) *roubali* BALTHASAR, 1935であるが，♀のみで記載され，♂がどのような形態をしているか今日まで不明であった．検討中の標本から当該種の♂を見出したので，改めて♂を記載した．第4の種は*O.* (*Indachorius*) *hsui* MASUMOTO, CHEN et OCHI, 2004である．本種の♂は通常頭頂に顕著な一角を有するが，小型の♂では角の代わりに♀の特徴である2顆粒を具える個体が見られたのであわせて報告した．

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